

Amendments to the Drawings:

Please find attached a replacement sheet for Figures 1A, 1B, and 2. Figs. 1A and 1B have been amended to add the designation "PRIOR ART." Also attached an annotated sheet clearly identifying these designations as newly added. No new matter has been added by this amendment.

Attachments: 1 Replacement Sheet

 1 Annotated Sheet

STATUS OF CLAIMS

Claims 1 – 10¹ are pending.

Claims 1 – 10² stand rejected.

Claims 1 – 10 have been amended herein, without prejudice or disclaimer.

New Claim 11 has been added.

REMARKS

Reconsideration of the application is respectfully requested.

Amendments to the Specification

The Claim for Priority section has been amended to clarify that the present application is the national stage application under 35 U.S.C. § 371 of an International Application No. PCT/FR2003/01917 and to clearly indicate said International Application and the underlying French application No. 02/07726 have been incorporated by reference in their entireties. No new matter has been added by this amendment.

Claim Amendments

Claims 1 – 10 have been amended to conform to the US prosecution practice. Particularly, Claims 1 – 10 have been amended to delete the reference numerals. No new matter has been added.

¹ The Office Action Summary indicates that Claims 1 – 9 are pending, whereas the Examiner appears to have examined Claim 1 – 10. The Examiner has objected to Claim 10 (see Page 2, Paragraph 4) and rejected Claim 10 (See Page 6, Paragraph 16). Applicants assume the Office Action Summary contains a typographical error. Clarification is respectfully requested.

² See Footnote 1.

Claim 1 has been amended to improve its readability. Particularly, the implicit step in the phrase “the determination of the position with respect to the device of a target, mechanically coupled to the object, by means of the impression of the target on the image,” has been explicitly recited as the step of “determining the position of a target with respect to the device, said target being mechanically connected to the object, based on the impression of the target on the image of the object.” Similarly, the implicit step in the phrase “the determination of the position of the target with respect to the reference frame” has been explicitly recited as the step of “determining the position of the target with respect to the reference frame.” Finally, the phrase “the position of the device with respect to a reference frame is determined,” is reworded to now recite “determining the position of the device with respect to the reference frame.” Support can be found throughout the specification as well as the claims, for example, original claim 1, as set forth above. No new matter has been added by this amendment.

The preambles of dependent Claims 2 – 10 have been amended to recite a method instead of a device in conformance with the USPTO prosecution requirements. Claims 4 and 8 have also been amended to improve their readability. Claim 10 has been amended to recite the feature “at least three supports” instead of the term “cylinders.” This amendment is consistent with the feature “at least three supports” recited in base claim 8. No new matter has been added by these amendments.

Amendments to the Drawings

Figs. 1A and 1B have been amended to add the designation "PRIOR ART." No new matter has been added by this amendment.

Claim Objections

Claims 2 – 8 stand objected to under 37 CFR § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claims 9 – 10 stand objected to under 37 CFR § 1.75(c) as being of improper dependent subcombination form for failing to further limit the subject matter of a previous claim.

As set forth above, Claims 2 – 10 have been amended to further limit the subject matter of base claim 1 and to include every limitation of the parent claims. Applicants respectfully submit that amended Claims 2 – 10 are in full compliance with the requirements of 37 CFR 1.75(c). Accordingly, reconsideration and removal of this objection to Claims 2 – 10 is respectfully requested.

Claims Rejections – 35 U.S.C. § 112

Claims 1, 4, 6, 7, 8, and 9 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Each of these rejections are responded to as set forth below.

Claim 1 stands rejected for reciting the limitation "the reference frame," in line 3, without sufficient antecedent basis. In response, Claim 1 has been

amended to recite "a reference frame" in line 3, to provide proper antecedent basis. The Examiner further states that Claim 1 does not set forth any steps involved in the method/apparatus, it is unclear what method/process the applicant is intending to encompass. Amended Claim 1 recites particularly the steps of the method for determining the position of a device with respect to a reference frame when an image of an object is taken.

Claim 4 stands rejected for reciting "its" wherein it is not clear what "its" is intended to refer to. In response, Claim 4 has been amended to clarify that the position of the feeler with respect to the reference frame is determined by a localization system.

Claim 6 stands rejected for reciting the limitation "the acquisition of two images" without sufficient antecedent basis. In response, Claim 6 has been amended to recite "an acquisition of a first image and an acquisition of a second image," to provide proper antecedent basis.

Claim 7 stands rejected for reciting the feature "impressions" in line 4 and the feature "the projection" in line 5, each without sufficient antecedent basis. In response, Claim 7 has been amended to recite "a plurality of characteristic impressions," and to recite "a projection" to provide proper antecedent basis.

Claim 8 stands rejected for reciting "it" in line 4 wherein it is not clear what "it" is intended to refer to. In response, Claim 8 has been amended to recite that the target comprises at least three supports. Claim 8 also stands rejected for reciting the feature "the determination [sic] directions being non coplanar."

Applicants respectfully traverse this rejection for at least the following reasons. Claim 8 recites that the target comprises at least three supports, wherein each support contains a plurality of balls opaque to X-rays substantially aligned along a determined direction, *i.e.*, one determined direction for each support and thus a total of three determined directions for the three supports. Claim 8 further recites “the determined directions being non-coplanar,” thereby further clarifying that there is a distinct determined direction corresponding to each support. Accordingly, there is sufficient antecedent basis for the feature “determined directions” in Claim 8.

Claim 9 stands rejected for reciting the features “the cylinders,” in line 2, without sufficient antecedent basis. Claim 9 does not recite the feature “the cylinders” at all. However, Claim 10 does recite the feature “the cylinders” in line 2. Applicants, therefore, assume that the Claim 10 stands rejected. Claim 10 has been amended to recite the feature “at least three supports,” consistent with the feature “at least three supports” recited in base Claim 8, instead of the feature “the cylinders.” Accordingly, there is sufficient antecedent basis for the feature “at least three supports” in Claim 10.

In light of the amendments set forth above, Applicants respectfully submit that Claims 1, 4, and 6 – 10, as amended, are fully compliant with the statutory requirements of 35 U.S.C. § 112. Accordingly, reconsideration and removal of these 35 U.S.C. § 112, second paragraph, rejections of Claims 1, 4, and 6 – 9 is respectfully requested.

Furthermore, the Examiner states that Claims 2 – 10 do not set forth any positive structural limitations in the apparatus, it is unclear what apparatus applicant is intending to encompass. Claims 2 – 10 have been amended to recite a method, and add limitations to the method of base claim 1.

Claim Rejections – 35 U.S.C. § 102(e)

Claims 1 – 7 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Zheng et al. (U.S. Patent 7,117,027). Applicants traverse these rejections for at least the following reasons.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." See, M.P.E.P. §2131 citing Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Claim 1, as amended, recites:

1. A method for determining the position of a device providing images by X rays with respect to a reference frame as an image of an object is taken, said method comprising the steps of:

determining the position of a target with respect to the device, said target being mechanically connected to the object, based on an impression of the target on the image of the object;

determining the position of the target with respect to the reference frame; and

determining the position of the device with respect to the reference frame based on the position of the target with respect to the device and the position of the target with respect to the reference frame.

Zheng et al. discloses a system and method for preparing a virtual three-dimensional representation of a bone or a portion thereof from imaging data. See Col. 1, lines 13 – 15. Zheng et al, in fact, states that the “determination of the position of the imaging device 6 is not essential to the invention.” See Col. 7, line 66 to Col. 8, line 1. Claim 1 of the present application, on the other hand, recites a “method for determining the position of a device providing images by X rays with respect to a reference frame as an image of an object is taken.” Zheng et al. fails to teach or disclose at least the following features of Claim 1: “determining the position of a target with respect to the device, said target being mechanically connected to the object, based on an impression of the target on the image of the object,” and “determining the position of the device with respect to the reference frame based on the position of the target with respect to the device, and the position of the target with respect to the reference frame.”

Zheng et al. discloses a method for establishing a three-dimensional representation of a bone. See Col. 7, line 45 to Col. 8, line 63. Zheng et al. uses a mobile X-ray device 6, in different positions with respect to a bone 21 to obtain at least two images 11, 13. See Col. 7, lines 45 – 54; see also Figs. 1 and 3. A reference means 5 is attached to X-ray device 6. See Col. 8, lines 61 – 63. Zheng describes very broadly that the position and orientation of the reference means fixedly attached to the C-arm X-ray device is known. See Col. 6, lines 19 – 24. This manner of determining the position of the X-ray device is already described in the background of the present application. See Specification of

Published Application No. 2006/0155189, Paragraphs [0016] – [0017] (attaching a rigid localization body 19 on radiographic device 16.); see also Paragraph [0018] (describing the use of two radiographic images to determine a three-dimensional representation of object 10). The present Claim 1, on the other hand, recites a method for determining the position of the imaging device by determining the position of a target with respect to the device, wherein the target is mechanically coupled to the object, based on an impression of the target on the image of the object to obviate the disadvantages of this prior art method. See Specification, Paragraphs [0020] – [0023]. Zheng et al., therefore, fails to teach or disclose at least these features of Claim 1, wherein the positions of the target with respect to the device and of the target with respect to the reference frame are determined and based on those determinations, the position of the device with respect to the reference frame is determined. Accordingly, reconsideration and removal of this 35 U.S.C. § 102(e) rejection of Claim 1 is respectfully requested.

Dependent Claims 2 – 7 depend from ultimately from allowable base Claim 1. At least by the virtue of their dependence from Claim 1, and in light of the reasons set forth above with regard to Claim 1, Claims 2 – 7 are also allowable. Accordingly, reconsideration and removal of this 35 U.S.C. § 102(e) rejection of Claims 2 – 7 is respectfully requested.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 8 – 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zheng et al in view of Krause et al. (U.S. Patent Application Publication No. 2004/0068187). Applicants traverse these rejections for at least the following reasons.

Claim 8 recites:

8. The method of any of claims 1 to 7, wherein the target comprises:

a first plurality of elements transparent to X rays;

a second plurality of elements opaque to X rays; and

wherein said first plurality of element comprises at least three supports transparent to X rays, each support containing said second plurality of elements, comprising a plurality of balls opaque to X rays substantially aligned along a determined direction, the determined directions being non coplanar.

Claim 8 depends from Claim 1 which recites a method for determining the position of an imaging device. As set forth above, Zheng et al. fails to teach or disclose the method recited by Claim 1. Like Zheng, Krause also discloses a method for generating three-dimensional models of a bone that uses two or more two-dimensional images of patient's bone. See Paragraph [0003]. Krause fails to cure the deficiencies of Zheng et al. In fact, Krause teaches that a user may manually input the position coordinates of the X-ray camera. See Paragraph [0086]. This implies that Krause does not teach or suggest any method for

determining the position of the imaging device with respect to a reference frame at all. Although Krause does disclose the use of the impressions of markers 170, 2110, and 2172 on X-ray or fluoroscopic images, see Paragraphs [0123], [0174], and [0179], these impressions are actually used for identifying fixator ring 168 as well as the orientation of the fixator on the patient's bone. See Paragraph [0123]. Furthermore, these markers are used to assist a surgeon as a location mechanism and as an anchor for the surgical guides. See Paragraph [0174]. There is absolutely no hint or suggestion that these markers, and their impressions on an X-ray may or can be used to locate the position of the imaging device with respect to a reference frame. Accordingly, the cited combination of Zheng et al. and Krause fail to teach or suggest a method for determining the position of the imaging device as recited by Claims 1 and 8. Reconsideration and removal of this 35 U.S.C. § 103(a) rejection of Claim 8 is respectfully requested.

Dependent Claims 9 and 10 depend from allowable Claim 8 and ultimately from allowable base claim 1. At least by the virtue of their dependence from Claim 8, and in light of the reasons set forth above with regard to Claims 1 and 8, Claims 9 and 10 are also allowable. Accordingly, reconsideration and removal of this 35 U.S.C. § 103(a) rejection of Claims 9 and 10 is respectfully requested.

New Claim

Claim 11 has been newly added. Claim 11 is a system claim corresponding to amended method Claim 1. Support may be found in the

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specification, for example, at Paragraph [0034]. No new matter has been added.

For the reasons set forth above with regard to independent Claim 1, Claim 11 is also allowable.

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CONCLUSION

Having addressed all outstanding grounds raised by the Examiner, Applicant respectfully submits the present case is in condition for allowance, early notification of which is earnestly solicited.

Should there be any questions or outstanding matters, the Examiner is cordially invited and requested to contact Applicant's undersigned attorney at his number listed below.

Respectfully submitted,



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